

WHAT IS CLAIMED IS:

1                   1. A disk array apparatus, comprising:  
2                   a connector provided for connection with an external power supply to receive  
3 power from the external power supply;  
4                   an internal power supply section for supplying the power received from the  
5 connector after AC/DC conversion;  
6                   a plurality of disk drive cabinets, each connected to the internal power supply  
7 section, each including: a first voltage converter for subjecting the power coming from the  
8 internal power supply section to DC conversion to derive a different voltage; a disk drive for  
9 receiving the power as a result of conversion by the first voltage converter; and a first backup  
10 power supply for storing the power provided to the first voltage converter;  
11                  a communications adapter connected to the internal power supply section for  
12 performing data exchange with an external device, including: a second voltage converter for  
13 subjecting the power coming from the internal power supply section to DC conversion to  
14 derive a different voltage; a plurality of power consumption circuits for receiving the power  
15 as a result of conversion by the second voltage converter; and a second backup power supply  
16 for storing the power provided to the second voltage converter;  
17                  a disk adapter connected to the internal power supply section for controlling  
18 data writing or reading to/from the disk drive cabinets, including: a third voltage converter  
19 for subjecting the power coming from the internal power supply section to DC conversion to  
20 derive a different voltage; a plurality of power consumption circuits for receiving the power  
21 as a result of conversion by the third voltage converter; and a third backup power supply for  
22 storing the power provided to the third voltage converter;  
23                  a memory section connected to the internal power supply section for storing  
24 data and control information to be written or read to/from the communications adapter and  
25 the disk adapter, including: a fourth voltage converter to subject the power coming from the  
26 internal power supply section to DC conversion to derive a different voltage; a plurality of  
27 power consumption circuits for receiving the power as a result of conversion by the fourth  
28 voltage converter; and a fourth backup power supply for storing the power provided to the  
29 fourth voltage converter; and  
30                  a mutual power supply line that is connected to the disk drive cabinets, the  
31 communications adapter, the disk adapter, and to the memory section, so that when the power  
32 from the internal power supply section is interrupted, the mutual power supply line can

33 supply backup power to any of the components in need of power using the first backup power  
34 supply provided to each of the disk drive cabinets, the second backup power supply provided  
35 to the communications adapter, the third backup power supply provided to the disk adapter,  
36 and the fourth backup power supply provided to the memory section.

1                   2. The disk array apparatus according to claim 1, further comprising a  
2 detachable member for an additional backup power supply.

1                   3. The disk array apparatus according to claim 1, wherein in the detachable  
2 member, a region for incorporating a backup power supply can be used for incorporating a  
3 device to be incorporated into the disk drive cabinet, the communications adapter, the disk  
4 adapter, and the memory section.

1                   4. The disk array apparatus according to claim 1, wherein the first backup  
2 power supply is detachable from the disk drive cabinet, the second backup power supply is  
3 detachable from the communications adapter, the third backup power supply is detachable  
4 from the disk adapter, and the fourth backup power supply is detachable from the memory  
5 section.

1                   5. The disk array apparatus according to claim 2, wherein power stored in the  
2 additional backup power supply is supplied to any of the components in need thereof through  
3 the mutual power supply line.

1                   6. The disk array apparatus according to claim 1, wherein when the power  
2 from the internal power supply section is interrupted, from the backup power supply  
3 corresponding to any of the components that has been stopped in operation responding to  
4 completion of a save process executed to save data that has been temporarily stored in the  
5 memory section into a disk drive in the disk drive cabinet, the data stored therein is supplied  
6 to any of the components in operation through the mutual power supply line.

1                   7. The disk array apparatus according to claim 1, wherein the second and third  
2 voltage converters each is a fast-transient-response-type non-isolated DC/DC converter.

1                   8. The disk array apparatus according to claim 1, wherein an output voltage  
2 from the internal power supply section is set low enough to be directly supplied through the

mutual power supply line to the second and third voltage converters, wherein the second and third voltage converters each is a fast-transient-response-type non-isolated DC/DC converter.

9. The disk array apparatus according to claim 1, wherein the first and fourth voltage converters each is a non-isolated DC/DC converter.

10. The disk array apparatus according to claim 1, wherein the first to fourth backup power supplies each includes a charge/discharge circuit and a secondary battery.

11. A power backup method for a disk array apparatus, comprising:  
a first step of receiving power from an external power supply through a connector provided for connection therewith;

a second step of supplying the power received from the connector in the first step after AC/DC conversion in an internal power supply section;

a third step of converting a direct current coming from the internal power supply section as a result of AC/DC conversion in the second step into another direct current having a different voltage by a first voltage converter each provided to a plurality of disk drive cabinets that are connected to the internal power supply section;

a fourth step of supplying the power as a result of conversion by the first voltage converter in the third step from the first voltage converter to a disk drive provided to each of the disk drive cabinets;

a fifth step of supplying the power as a result of conversion by the first voltage conversion in the third step from the first voltage converter to a first backup power supply for storing the power to be supplied to the first voltage converter each provided to the disk drive cabinets;

a sixth step of converting the direct current coming from the internal power supply section in the second step into another direct current having a different voltage by the second voltage converter of a communications adapter for data provision and reception with an external device that is connected to the internal power supply section;

a seventh step of supplying the power as a result of conversion by the second voltage converter in the sixth step from the second voltage converter to a plurality of power consumption circuits of the communications adapter;

an eighth step of supplying the power as a result of conversion by the second voltage converter in the sixth step from the second voltage converter to a second backup

power supply for storing the power to be supplied to the second voltage converter of the communications adapter;

a ninth step of converting the direct current coming from the internal power supply section in the second step into another direct current having a different voltage using a third voltage converter of a disk adapter that controls data writing or reading to/from the disk drive cabinets that are connected to the internal power supply section;

a tenth step of supplying the power as a result of conversion by the third voltage converter in the ninth step from the third voltage converter to the power consumption circuits of the disk adapter;

an eleventh step of supplying the power as a result of conversion by the third voltage converter in the ninth step from the third voltage converter to a third backup power supply for storing the power to be supplied to the third voltage converter of the disk adapter;

a twelfth step of converting the direct current coming from the internal power supply section in the second step into another direct current having a different voltage using a fourth voltage converter of a memory section for storing data and control information to be written or read to/from the communications adapter and the disk adapter both connected to the internal power supply section;

a thirteenth step of supplying the power as a result of conversion by the fourth voltage converter in the twelfth step from the fourth voltage converter to the power consumption circuits of the memory section;

a fourteenth step of supplying the power as a result of conversion by the fourth voltage converter in the twelfth step from the fourth voltage converter to a fourth backup power supply for storing the power to be supplied to the fourth voltage converter of the memory section; and

a fifteenth step of, when the internal power supply section stops in current supply in the second step, through a mutual power supply line that is connected to components of the disk drive cabinets, the communications adapter, the disk adapter, and the memory section, performing power provision to any of the components in need of power using any of the corresponding backup power supplies.

12. The power backup method of the disk array apparatus according to claim 11, wherein the disk array apparatus further comprises a detachable member for an additional backup power supply.

1                   13. The power backup method of the disk array apparatus according to claim  
2 11, wherein in the detachable member of the disk array apparatus, a region for incorporating  
3 a backup power supply can be used for incorporating a device to be incorporated into the disk  
4 drive cabinet, the communications adapter, the disk adapter, and the memory section.

1                   14. The power backup method of the disk array apparatus according to claim  
2 11, wherein in the disk array apparatus, the first backup power supply is detachable from the  
3 disk drive cabinet, the second backup power supply is detachable from the communications  
4 adapter, the third backup power supply is detachable from the disk adapter, and the fourth  
5 backup power supply is detachable from the memory section.

1                   15. The power backup method of the disk array apparatus according to claim  
2 11, wherein in the disk array apparatus, power stored in the additional backup power supply  
3 is supplied to any of the components in need thereof through the mutual power supply line.

1                   16. The power backup method of the disk array apparatus according to claim  
2 11, wherein in the disk array apparatus, when the power from the internal power supply  
3 section is interrupted, from the backup power supply corresponding to any of the components  
4 that has been stopped in operation responding to completion of a save process executed to  
5 save data that has been temporarily stored in the memory section into a disk drive in the disk  
6 drive cabinet, the data stored therein is supplied to any of the components in operation  
7 through the mutual power supply line.

1                   17. The power backup method of the disk array apparatus according to claim  
2 11, wherein in the disk array apparatus, the second and third voltage converters each is a fast-  
3 transient-response-type non-isolated DC/DC converter.

1                   18. The power backup method of the disk array apparatus according to claim  
2 11, wherein in the disk array apparatus, an output voltage from the internal power supply  
3 section is set low enough to be directly supplied through the mutual power supply line to the  
4 second and third voltage converters, wherein in the disk array apparatus, the second and third  
5 voltage converters each is a fast-transient-response-type non-isolated DC/DC converter.

1                    19. The power backup method of the disk array apparatus according to claim  
2 11, wherein in the disk array apparatus, the first and fourth voltage converters are both a non-  
3 isolated DC/DC converter.

1                    20. The power backup method of the disk array apparatus according to claim  
2 11, wherein in the disk array apparatus, the first to fourth backup power supplies each include  
3 a charge/discharge circuit and a secondary battery.